

## CLAIMS

What is claimed is:

1. An apparatus for effecting a reaction between a reactant gas and a reactant liquid in a stirred autoclave which includes a catalyst holder which comprises:

5 an autoclave having an opening therein to permit access to its interior, a cover for the opening and at least one line to introduce reactants and remove product;

a fixed bed catalyst holder disposed within the autoclave comprised of a housing that is open at its top and at its bottom and having at least one side wall perforation at an upper portion of the housing and extending through the housing to permit flow of  
10 reactant liquid and reactant gas from the bottom of the housing and then from the interior of the housing to a point exterior of the housing;

a horizontal baffle connected at upper portion of the housing above said side wall perforation, the baffle configured to the contour of the interior wall of the autoclave to limit flow of reactant gas and reactant liquid between the edge of the baffle and the  
15 interior wall of the autoclave, said baffle having at least one perforation present in the baffle to permit flow of reactant liquid and reactant gas therethrough;

a side baffle external to the housing or affixed to the interior wall of the autoclave for directing reactant gas and reactant liquid downwardly from said side wall perforation to the inlet of the fixed bed catalyst;

20 an agitation system that includes a motor, an agitation shaft extending into the autoclave terminating in a turbine impeller; and,

a fixed bed catalyst retained within the housing to permit reactant liquid and reactant gas to pass from the bottom of the housing through the fixed bed catalyst and out the upper end of the fixed bed catalyst.

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2. The apparatus of Claim 1 wherein said agitator shaft incorporates a passageway having an end terminating for discharge at said turbine impeller and terminating at another point near an upper portion and into the headspace of said autoclave, said turbine positioned adjacent the at least one side wall perforation in said housing such that reactant liquid and reactant gas are forced outwardly through said side wall perforation by said turbine impeller and against the interior wall of the autoclave.

3. The apparatus of Claim 2 wherein there is a plurality of perforations substantially uniformly distributed about the side wall of said housing for permitting a mixture of reactant liquid and reactant gas to flow therethrough.

4. The apparatus of Claim 3 wherein the horizontal baffle has a plurality of perforations substantially uniformly distributed for permitting flow of a reactant liquid and reactant gas upward and downward in the autoclave.

5. The apparatus of Claim 4 wherein the fixed bed catalyst is a monolith catalytic reactor comprised of a monolith substrate and a catalytic metal.

6. The apparatus of Claim 5 wherein the catalytic metal in said monolith catalytic reactor is selected from the group consisting of VIb, Group VIIb, Group VIII, and Group Ib metals of the periodic table.

7. The apparatus of Claim 6 wherein the catalytic metal is selected from the group consisting of cobalt, nickel, Raney or sponge nickel, palladium, platinum, copper, ruthenium, rhodium and rhenium.

5 8. In a process for carrying out a reaction between a reactant gas and reactant liquid in a stirred tank having at least a portion of reactant gas residing in a headspace portion of said autoclave, the improvement which comprises:

10 inserting a fixed bed catalyst holder in said tank comprised of a housing having an open top and open bottom portion supportably maintained with said tank, said housing having a substantially outwardly extending, horizontal baffle near its top portion and adapted for substantial sealing engagement with the interior wall of said tank, said baffle having a least one perforation in its surface, and said housing having at least one side wall perforation in the wall near its upper portion permitting flow from the interior of the housing to said tank;

15 supportably retaining a fixed bed catalyst within said housing permitting both liquid and reactant gas flow therethrough;

20 extending an agitator shaft into said tank and terminating in a turbine blade substantially adjacent the side wall perforation in the wall of said housing, said agitator having a gas passageway including an opening in the headspace portion of said autoclave and terminating in an opening adjacent the turbine blade;

effecting agitation at a point adjacent the side wall perforation in the wall of said housing causing liquid and reactant gas to be passed from the interior of the housing through the perforations to the interior of the autoclave;

25 drawing reactant gas hydrogen from the headspace in said autoclave through a passageway in said agitator to a point adjacent the turbine;

forcing a mixture of reactant liquid and reactant gas via baffling from a point adjacent the side wall perforations in said housing to the inlet of the fixed bed catalyst by means of baffles extending from the top to at least the bottom portion of said housing; and then,

5            reacting the mixture of reactant gas and reactant liquid.

9.        The process of Claim 8 wherein the reaction is a hydrogenation reaction.

10            10.        The process of Claim 9 wherein the reactant liquid is a nitroaromatic compound.

11.        The process of Claim 10 wherein the nitroaromatic compound is dinitrotoluene.

15            12.        The process of Claim 10 wherein the nitroaromatic compound is nitrobenzene.

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